

BOREHOLE GEOPHYSICS FOR INVESTIGATIONS OF GROUND-WATER CONTAMINATION IN FRACTURED BEDROCK

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Borehole geophysics has provided critical information for investigations of ground-water contamination in fractured bedrock. The U. S. Geological Survey has applied borehole-geophysical methods at sites contaminated with volatile organic compounds (VOCs) and underlain by sedimentary and crystalline bedrock in the Northeast and California. These methods include gamma and induction logging; borehole imaging (acoustic and optical televiewer); and fluid- property logging (specific conductance and temperature), single- and cross-hole flowmeter testing (heat pulse and electromagnetic), and point sampling for VOCs under ambient and pumped conditions. Integrated analysis of the borehole geophysical logs helped to delineate lithology; correlate stratigraphic units; and define the distribution and orientation of bedding, foliation, and fractures. The analysis also helped to characterize the distribution of fracture-flow zones; quantify vertical flow between zones in open boreholes under ambient and pumped conditions; and estimate transmissivity, hydraulic head, and connectivity of the zones. The geohydrologic information gained through the application of borehole geophysics was useful for general site characterization and source identification as well as the design and evaluation of monitoring and remediation programs.